

# Notice of Allowability

Application No.

10/719,504

Examiner

Ben Lewis

Applicant(s)

GALLOWAY, TERRY R.

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## -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 6/7/06.
2. ☒ The allowed claim(s) is/are 1-16 and 32-40.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) ☐ All b) ☐ Some\* c) ☐ None of the:
    1. ☐ Certified copies of the priority documents have been received.
    2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
  5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
    - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.
    - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

### Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date \_\_\_\_\_
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date \_\_\_\_\_
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other \_\_\_\_\_

## **DETAILED ACTION**

### **REASONS FOR ALLOWANCE**

Claims 1-16 and 32-40 are allowed. The invention of independent claims 1 and 32 recites:

A process for converting carbonaceous feedstocks into energy without the production of unwanted greenhouse gas emissions comprising:

(a) converting a carbonaceous feedstock selected from the group consisting of coal, hydrocarbon oil, natural gas, petroleum coke, oil shale, carbonaceous-containing waste oil, carbonaceous-containing medical waste, carbonaceous-containing military waste, carbonaceous-containing industrial waste, carbonaceous-containing medical waste, carbonaceous-containing sewage sludge and municipal solid waste, carbonaceous-containing agricultural waste, carbonaceous-containing biomass, biological and biochemical waste, and mixtures thereof, and a greenhouse gas stream in a gasification unit to synthesis gas comprising carbon monoxide and hydrogen, said gasification unit is a non-catalytic high temperature, gas-phase indirectly heated kiln having an inlet means, a gas outlet means, and a solids outlet between the inlet means and the gas outlet means operating at a temperature gradient along the length of the kiln of about 200<sup>0</sup>C to about 1600<sup>0</sup>C (400-2900<sup>0</sup>F) and at conditions to achieve a gas

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exit temperature of from at least 700.degree. to about 1600.degree. C. (1300-2900.degree. F.);

(b) electrochemically oxidizing at least a portion of said synthesis gas from said gasification unit in a first half-cell of a fuel cell (anode) to a first half-cell exit gas comprising carbon dioxide and water;

(c) recovering the carbon dioxide from said first half-cell exit gas to serve as at least 20% of said greenhouse gas stream in step (a); and

(d) electrochemically reducing an oxygen-containing gas in a second half-cell of said fuel cell (cathode) completing the circuit and resulting in the production of electrical energy.

The invention of independent claim 32 recites:

A process for converting carbonaceous feedstocks into energy without the production of unwanted greenhouse gas emissions comprising:

(a) converting a carbonaceous feedstock selected from the group consisting of coal, hydrocarbon oil, natural gas, petroleum coke, oil shale, carbonaceous-containing waste oil, carbonaceous-containing medical waste, carbonaceous-containing military waste, carbonaceous-containing industrial waste, carbonaceous-containing medical waste, carbonaceous-containing sewage sludge and municipal solid waste, carbonaceous-containing agricultural waste, carbonaceous-containing biomass, biological and biochemical waste, and mixtures thereof, and a greenhouse gas stream in a gasification unit to synthesis gas comprising carbon monoxide and hydrogen, said

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gasification unit is a non-catalytic high temperature, gas-phase indirectly heated kiln having an inlet means, a gas outlet means, and a solids outlet between the inlet means and the gas outlet means operating at a temperature gradient along the length of the kiln of about 200<sup>0</sup>C to about 1600<sup>0</sup>C (400-2900<sup>0</sup>F) and at conditions to achieve a gas exit temperature of from at least 700.degree. to about 1600.degree. C. (1300-2900.degree. F.);

(b) electrochemically oxidizing at least a portion of said synthesis gas from said gasification unit in a first half-cell of a fuel cell (anode) to a first half-cell exit gas comprising carbon dioxide and water;

(c) electrochemically reducing an oxygen-containing gas in a second half-cell of said fuel cell (cathode) completing the circuit and resulting in the production of electrical energy.

The prior art does not teach or suggest a cell including all of the claimed features. The most pertinent art includes Taylor et al. (US 5,423,891), which discloses a method for direct gasification of solid waste materials wherein method and apparatus for direct gasification of solid waste by heating solid waste materials continuously in the absence of air to high temperature to directly produce a high BTU gas, and more particularly to a method and apparatus which utilizes a rotary retort and a flash calciner for significantly improving the efficiency of the direct gasification process (Col 1 lines 5-15). As will be seen hereinafter, for purposes of illustration, makeup HCS in the form of

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mill scale is supplied as needed to the circulating HCS to maintain the desired heat transfer to ensure that the waste water treatment plant sludge is heated to the desired 1200<sup>0</sup>F to 1400<sup>0</sup>F in the absence of oxygen to effect by pyrolysis, the direct gasification of the hydrocarbon content of the waste W (Col 3 lines 60-67). The rotary kiln 18, which may be a Fuller-Traylor rotary kiln, facilitates the high efficiency, near instantaneous heat transfer between the hot particles of the HCS and the hydrocarbon material waste W. The interior of the rotary kiln is sealed and the atmosphere lacks oxygen to prevent combustion, but instead causes the direct conversion of the hydrocarbon content of the waste W into carbon and gas. With the temperature of the HCS entering the rotary kiln at near 1800<sup>0</sup>F, this provides a  $\Delta T$  of 400<sup>0</sup>F to 600<sup>0</sup>F. The temperature may be reduced to below 1400<sup>0</sup>F to minimize or prevent agglomeration of glass if the waste has significant glass content, depending upon whether glass is clear, green or brown glass, all having different melting temperatures. In a system 10 under a predescribed flow rate, a given weight HCS is heated in the flash calciner 16 to a temperature that, in turn, will heat the waste W in the rotary kiln 18 to a temperature adequate to effect the direct conversion of the hydrocarbons to carbon and gas, usually between 1200<sup>0</sup>F and 1500<sup>0</sup>F (Col 5 lines 41-67). In the preferred embodiment of the invention as exemplified by drawing FIGS. 1 and 2 and the process description within the specification employing the apparatus components operating under the method steps of the present invention, an effective indirect heating process results which effectively and cheaply directly converts hydrocarbons, carbohydrates, etc. into a high BTU gas and carbon (Col 9 lines 31-40).

The Taylor et al. reference does not teach or suggest having a temperature gradient along the length of the kiln of about 400<sup>0</sup>F to about 2900 <sup>0</sup>F.

For these reasons, the claims are allowed over the prior art. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ben Lewis whose telephone number is 571-272-6481. The examiner can normally be reached on 8:30am - 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Ben Lewis



PATRICK JOSEPH RYAN  
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